

Mojave Desert  
Air Quality Management District

COMPLIANCE TEST PROCEDURAL MANUAL

March 25, 2002

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### I. Purposes and Definitions

#### Purpose:

The **Mojave Desert Air Quality Management District** was formerly the San Bernardino County Air Pollution Control District. By an act of the California State Legislature, the former succeeded the latter effective on July 1, 1993. Hereinafter, this Document will refer to the District in all cases. The District determined a need to develop administrative and technical procedures for compliance emission tests. After significant deliberation, with the entire staff contributing, the District arrived at the minimum but necessary steps described herein for these procedures.

The owner/operator, hereinafter o/o, shall be notified by the District of the requirement of compliance testing. This is usually manifested by a permit condition. Tests may be necessary as the result of a condition on a permit, a notice of violation, investigation of a complaint, baseline emissions determinations, banking credits or others.

The District will arrange a pre-test meeting with the o/o and their selected test firm with the District at a mutually convenient date, time and place.

Subsequent to this meeting, the o/o, shall provide the District with a written protocol which delineates the methods of sampling, analyses, QA and report requirements agreed to during the meeting. This document, with its unique identification number, becomes the binding agreement between the District and the o/o.

The District shall evaluate the protocol and notify the o/o of modifications/amendments necessary.

Generally, the District will allow the test firm to effect the amendments/modifications by means of a letter of transmittal, which specifies the changes and cross-references them to the protocol. To this end the District requires that the o/o uniquely identify each protocol submitted for District review.

The District expects the compliance test to rigorously adhere to the protocol submitted and amended as may be necessary.

This summary of purpose is not meant to be complete nor definitive. Its main objective is to provide the basic actions required to effect results, which are representative, accurate and have the capacity to be easily evaluated. These procedures will be amended and/or emended from time to time.

The following section describes, in general terms, what a “source test” is. Other terms are also defined.

#### **Definitions:**

A source test is generally a collection of data and/or samples for a variety of reasons. “Source Test” is not a specific definition recognized by the District. The District uses this term for tests conducted at the source, as opposed to tests conducted on a similar, bench-scale or pilot plant unit. Source test is non-specific.

A. The District defines Compliance Test as a series of measurements, collections and analyses of samples, which define the emissions of a specific source of contaminants. The District evaluates the results of these tests and by comparison of them with District Rules and Regulations makes a determination of compliance (or non-compliance).

NOTE: The District shall only evaluate the results of compliance tests. For the results of a compliance test to be considered, the entire test shall have conformed to all applicable District Rules and Regulations, and those procedures, as modified if necessary, spelled out in the protocol.

The District defines Performance Test as a series of emissions tests, which define the collection efficiency of a piece of control equipment. These devices may be any number of devices or combinations thereof. When a permit condition specifies a collection efficiency minimum in order to demonstrate compliance with the applicable rules and regulations, then a performance test will be a Compliance Test **if** it adheres to the standards described in A above. A performance test conducted according to procedures specified by the manufacturer or supplier may not necessarily be a compliance test.

C. The District defines Process Evaluation Tests as those, which are used to optimize the process. Some processes by their inherent design can be readily evaluated by monitoring their emissions. Combustion processes lend themselves to this sort of evaluation. Indeed, combustion efficiencies are commonly ascertained by collecting samples of, or continuously monitoring,

effluent gases.

The District defines RESEARCH & DEVELOPMENT TESTS as those emissions tests whose primary purpose is to determine design and/or modification criteria. R&D tests may be conducted on pilot-plant units to simulate new/innovative technology.

E. The District defines IN HOUSE TESTS (or Directional Tests) as those performed by the o/o for their own reasons. The District emphasizes that the o/o shall not submit emissions results to the District for the purpose of demonstrating compliance with any District Rule without the administrative and technical steps described in this section being taken.

## II. Compliance Test Protocol Meeting

Prior to any emissions testing within the District's jurisdiction, the o/o shall notify the District. The District may exercise its option to send observers.

With respect to COMPLIANCE TESTS, the District will generally initiate and approximate the schedule, as part of conditions to operate/construct, variance agreements, PSD conditions, emissions inventories or other reasons.

Subsequent to the District's requirement of compliance demonstration, the o/o shall submit a written protocol. To this end, the District may require a pre-test meeting with our staff, the o/o and the testing firm.

This meeting may be necessary for the following reasons at least:

1. Personnel safety for all concerned organizations
2. Acquaint testing firm and others with the plant and appurtenant facilities
3. Agreement to methodologies for sample collection and any analyses, record keeping and report requirements; and
4. Preliminary agreement to items, which shall be provided by the o/o.

Safety requirements will follow California and Federal OSHA as minima. Additionally the o/o will generally have specific precautions for their operations, and these should be addressed. The District recognizes along with other competent organizations that emissions testing is dangerous and hazardous for at least the following reasons:

1. Heights
2. Platforms may have been erected prior to standards being set for emissions testing requirements
3. Toxic/Lethal gases in the exhaust gases from the source to be tested or other sources proximate to it
4. High voltage lines nearby
5. Electrical instruments and sometimes necessary ice-water baths in close proximity to the testing firms personnel
6. Process heat, or extremes of ambient conditions, e.g. duct skin temperatures in excess of 250° F and wind conditions, which make even walking dangerous
7. Noise can be distracting and may cause communication between personnel

conducting the test to be difficult if not impossible

**NOTE:** The District directs the personnel involved to the article, Safety in Atmospheric Emission Testing, by R.W. Gerstle, P.E., and William DeWees of PEDCO Environmental. PEDCO changed their name to PEI in the 1980's. Copies of this article will be furnished, upon written request, by the District.

In some instances, compliance testing may be required at regular intervals. Bearing this in mind, the District strongly suggests that the sampling location be maintained and if necessary, restructured to

provide not only a safe working area, but one that may easily accommodate the necessary complement of test crew, observers, safety personnel (where required) and the equipment.

Relocation, or other modifications to existing test sites may be required. See **Appendix A.**

The o/o may elect to provide specific safety equipment to all who expect to participate in the test. Additionally, the o/o may reasonably be expected to furnish uninterrupted power for sampling equipment, water for water cooled probes, drinking water where none is convenient and other necessities in order to provide safe and smooth working conditions.

The pre-test meeting shall specifically address compliance test methods. Deviations from acceptable methods shall be agreed to during this meeting. District compliance **REQUIRES** pre-**AS WELL AS** post- calibrations of the critical components of the equipment used for the sampling and flow measurements. These calibrations include but are limited to the following:

1. meters
2. orifices
3. magnehelics/draft gauges
4. thermometers
5. nozzle measurements
6. pitot factors and pitot-probe minimum distances
7. aneroid barometers

Methods, which are agreed to during this meeting, may be US EPA or California State EPA (ARB). These methods spell out precisely what data are required. Failure to adhere rigorously to any phase of the protocol shall be sufficient to void the test and find the o/o to be out of compliance. It should be noted here that EPA & CARB both state, that deviations/modifications to methods without prior approval may be attempted. To do so risks re-testing if the District rejects the changes as unacceptable.

Operational and/or process production rates shall be agreed to prior to the test. The rates will generally be those stipulated on the permit to operate. If lower rates are elected from those on the current permit, the District may re-issue the permit based on the rate achieved during the compliance test. This is of course only true if the compliance test demonstrates that the emissions were below the limit based on that rate.

Instrumentation (process and control equipment) data shall be collected during the testing to verify production rates and ensure equipment is functioning according to permit parameters. In-situ monitoring equipment data shall be operating also, if applicable.

Because the test **protocol and subsequent test reports** are formal documents, which should stand on their own contents, considerable effort is warranted in how thorough, complete, accurate and legible they are when submitted. The District has provided our minimum requirements for both documents.

No later than 30 days subsequent to the meeting, the o/op shall provide a written protocol, which thoroughly describes all methods and any deviations agreed thereto to the District. Once the District has approved the final protocol, the o/o shall by telephone and in writing (faxes are acceptable) notify the District within ten days of the actual test dates. Changes to the methods agreed to in the protocol may only be given approval by the District representative during the actual testing.

The District acknowledges that a pre-site meeting may require the o/o to engage their test firm representative for a fee. Additionally, the District admits that the o/o personnel workload and inconvenience may be increased at extra expense to them. The District is also confident, based on experience, through this extra effort/communication, more expensive problems are resolved and that the goals of an accurate, representative and documented compliance test will be realized. The end results of valid compliance tests are many, and all of them save the o/o and their test firm money.

### III. Compliance Test Protocol Submittal

Establishment of a more precise test protocol will become necessary with time. Several benefits will be derived, among which are:

1. less confusion and errors by District staff, facility personnel and their test crews,
2. more effective scheduling,
3. better control of testing programs and schedules, and
4. clearer directions for all concerned.

Compliance Test Protocol Minimum Requirements are as follows:

- a. Name, address, and telephone of the contact for the o/o of the source to be tested, **and** a unique number for the protocol;
- b. Permit number of the source(s) to be tested and a brief description of the source;
- c. Name, address and telephone of the supervisor of the firm which will be conducting the testing;
- d. Scope of the project (pertinent information):
  1. Purpose of the test
  2. Proposed test dates
  3. Pollutants/contaminants for which the tests are conducted
  4. Reference methods descriptions and deviations agreed to by the District
  5. Process/operational conditions to be maintained during the testing
- e. Names and titles of test team members if appropriate
- f. Quality assurance to be followed for the entire test program, which include at least:
  1. equipment calibrations and filter tare weights
  2. blank analyses for chemical species determinations
  3. sample chain of custody

- 4. appropriate others
- g. Site description inclusive of drawing with dimensions where known
- h. Approximate or Engineering estimates of the following:
  - 1. gas composition
  - 2. pollutant/contaminant concentration ranges
  - 3. gas velocity or volumetric flow rates from calculations, historic data or fan curves
  - 4. appropriate others
- i. Brief statement which acknowledges requirements of permit or District rules/regulations which are applicable
- j. Statement which acknowledges safety requirements specific to the source
- k. Brief statement relative to the salient features (deviations, amendments/modifications from accepted methods) agreed to by all at the pre-test meeting
- l. SIGNATURE OF A RESPONSIBLE OFFICIAL OF THE O/O.

#### IV. Minimum Test Report Requirements

The District requires that a Compliance Test Report be submitted within 45 days subsequent to the last day of on-site data gathering, sample collections and/or measurements, unless other times have been stipulated in the submitted Compliance Test Protocol and accepted by the District. The Test Report shall be addressed to the same District personnel as the Test Protocol. The District encourages and expects each test firm to have its own format and style of presentation/creation of a test report. The following minimum requirements allow any report to be easily read and facilitate the collected data to stand on its own merits.

The District knows this will not be a substantial burden to the test firm because in many instances a previous report, schematics etc may be easily changed in a word processor or photocopied.

The District's requirements (not necessarily in the order below) are delineated as follows:

##### A. Title Page

- 1. Name of Company who owns source to be tested
- 2. Location of the facility and specific source
- 3. Permit(s) number(s) of the sources to be tested
- 4. Name/address of test firm
- 5. Date(s) of the test(s)
- 6. Signature of a Responsible Official of the Test Firm
- 7. Signature of a Responsible Official of the o/o

##### B. Certification Page

- 1. Brief statement which describes test team leader or appropriate other test firm member as responsible for the data presented
- 2. Supervisor/manager of the test firm statement attesting to the accuracy and authenticity of the report

##### C. Table of Contents

##### D. Introduction

1. Reason for test
2. Parameters measured
  - a. physical measurements of the source site
  - b. gas flow (velocity, static pressure, temperature, approximate gas composition, others)
3. Contaminant levels to be reported (e.g. NO<sub>x</sub>, @3% O<sub>2</sub>)
4. Production/operations rate achieved during each phase of the test
5. Names of observers and their affiliations
6. Other pertinent information

#### E. Summary of Results

1. Physical measurements: emission site [Table I]
2. Gas flow measurements for each test run [Table II]
  - a. velocity
  - b. volumetric flow rates (ACFM and SCFMd)
  - c. gas static pressure and temperature
3. Gas composition
  - a. water vapor
  - b. appropriate other
4. Miscellaneous
  - a. isokinetic sampling rates (if applicable)
  - b. density and/or molecular weight of gas
  - c. excess air (if applicable)
  - d. appropriate others
5. Pollutant/contaminant emissions [Table III]
  - a. pollutant/contaminant concentration
  - b. pollutant/contaminant mass emission rate
  - c. allowable pollutant/contaminant concentration with the proper authority referenced
  - d. allowable pollutant/contaminant mass emission rate with the proper authority referenced
  - e. Appropriate others, e.g. opacity
  - f. Standard conditions of measurements

Note: All standard units shall be reported pursuant to District Rule 102, i.e. 60°F and 29.92 inches of mercury column

#### F. Facility Operation relative to the Process Tested

This section should at least embrace the basic process principles of operation. Brief to extensive discussion relative to air pollution control devices in the process, operating parameters (normal and existing on the day on-site measurements were effected), process flow diagrams, and information/calculations relative to those agreed to in the Test Protocol and any probable effects on the results of the test.

#### G. Results Discussion

A brief to extensive discussion of results which delineate operations, sample collections, shutdowns/malfunctions of process or sampling equipment, errors made and other issues which



may have direct bearing on determinations of compliance by the District.

**NOTE:** *The District acknowledges that some testing firms do not always contract with the o/o of the source to collect operational data. **THESE DATA ARE AN INTEGRAL PART OF ANY COMPLIANCE TEST CONDUCTED FOR REVIEW BY THE DISTRICT.** With this in mind, alternatives for the proper documentation of the necessary data are:*

1. *Collection by the District*
2. *Provision by the o/o to the test firm for inclusion in the report (the test firm may acknowledge that these data are presented without comment and is not responsible for their authenticity)*
3. *O/o may submit these data to the District as an addendum to the completed report.*

#### H. Sampling and Analytical Procedures

1. Brief description of the sampling equipment (including filters), deviations from that stipulated
2. Brief description of sampling procedures including deviations therefrom
3. Brief descriptions of all analytical procedures and any deviations

#### I. Appendices

1. Sample calculations for one entire run
2. Copies of all field data sheets and all operational data/logging sheets (when provided)
3. All laboratory reports and calibrations (pre-/post-)
4. Relevant correspondence specific to the test
5. Other relevant information including but not limited to schematics of sampling equipment, site measurements and a nomenclature definition table if necessary.

The District encourages all final report writers to state precisely what steps were taken, procedures followed and deviations made during the testing as well as the rationale for their deviations. Then too, the District suggests avoiding the use of ambiguous and meaningless terms of condition, such as “should have”, “ought to” and others.

### V. Compliance Test Evaluation Program

The District actively participates in the California EPA (ARB) Contractor Evaluation Program. We will also participate with other agencies and firms when so requested. This exchange of information is a necessary step, which must be taken to ensure uniformity in the application of sound scientific and engineering principles.

These principles ensure that representative data are collected while reducing biased or erroneous data. The evaluation program’s primary purpose is to establish consistency of methods application and is not meant to exclude or disparage any test firm neither directly nor by implication.

The areas, which the District will monitor during observation of a given test series, may be

discussed at any time. We encourage this dialogue at pre-test meetings, by telephone, correspondence and directly, in our offices. Suggestions are always welcome.

## APPENDIX A - Safety

### Background

With the increasing need for better pollutant/contaminant control and increased enforcement of emission standards, greater attention to adequate sampling platforms is mandatory. Emission testing by its very nature is complex and laborious. The District does not intend any testing which we may require, to be dangerous to personnel conducting, observing or supporting the test in any manner.

To this end, it behooves engineers and designers of new equipment to provide permanent and suitable sampling ports, safe sampling platforms (including guardrails), uninterrupted electrical power, protected ladders and others, which may be site/process specific. The District shall require any and all the above (and others where required) as a part of an Authority to Construct permit. The District may require it on Permit to Operate renewals when a condition specifies regular compliance testing.

The District recognizes that in rare cases permanent testing facilities are not practicable. When these cases do occur, the District will specify temporary scaffolding, access and ancillary requirements. The District discourages the use of “cherry picker” types of platforms.

### Specific Minimum Requirements

**Power Sources:** Uninterrupted, 115 V-20 A-60 Hz a.c. within 20 feet of the area where samples are to be collected. Two separate sources are to be made available and properly grounded.

**Sampling Ports:** Vertical circular stacks/ducts where the sum of the inside diameter of the stack, port extension and wall thickness is less than 10 feet, a minimum of 2 ports shall be provided in the same horizontal plane and 90° opposed. If the above sum is in excess of 10, then a minimum of 4 ports shall be provided, as above.

Vertical rectangular/square stacks and ducts ports shall be identical to those described in the Code of Federal Regulations (CFR), title 40, part 60, in appendix A, method 1.

Horizontal ducts whether rectangular, square or circular will be considered by the District on an individual basis.

Ports shall be a minimum of 4 in diameter (inside) of Schedule 40 pipe, externally threaded and standard cap for easy removal. This port shall be flush with the inside of the stack lining/wall and be continuously welded to the stack. Ports shall be capable of supporting a vertical shear of 200 lb (from above or below) and a radial tension (along the diameter of the stack) of 50 lb as well as side loads of 50 lb.

**Note:** When there exists the probability of corrosive/toxic/lethal gases, those ports shall be equipped with gate valves. The District may specify these valves for gases that are under significant temperature and/or pressure conditions on a case by case basis.

**Sampling Platform:** The platform shall be of sufficient strength to support at least 4 people

whose average weight is 175 lb, plus 500 lb of sampling equipment. It should also be at least 4 ft wide and extend fully around the stack when 4 ports are specified. When only 2 ports are required, the platform shall extend at least 2 ft beyond the vertical centerline of the ports. Guard-rails are mandatory. This railing shall extend fully with the platform, be rigid, 4 ft high and fitted with kick boards. Note: Some clearance may be required to provide access to the ports in the event bulky equipment is required. Dependent on the height of the stack the ladder shall be provided with either a safety rail or spidercage.

Additional Information: OSHA rules and regulations relative to the above shall supersede District specifications.

## APPENDIX B - Compliance Test Methods-Manual

California EPA (ARB) and US EPA methods are satisfactory for sources to which they apply. The District cannot emphasize strongly enough that they are METHODS and not guidelines. Acceptable alternatives, modifications and/or deviations shall be agreed to prior to any compliance test, which has been requested by the District.

The District may require compliance tests for the following reasons:

1. New Source Review Information
2. Authority to Construct Permits
3. Abatement Order
4. Permit to Operate (general or special conditions)
5. Variance Order
6. Inspection Evaluation
7. Complaint Investigation
8. Baseline definition
9. Emission Reductions
10. Banking Credits, and others.

California methods are delineated in Volumes I, II & III, as amended from time to time. These volumes may be obtained from the California Air Resources Board (Contact: Peter Ouchida (916) 322-6019). EPA methods are those found in Appendices A and B of Title 40, "Protection of the Environment" in the Code of Federal Regulations Chapter I, part 60 as amended from time to time. (Copies of the referenced CFR can be obtained by contacting the U.S. Government Printing Office Attention: Superintendent of Documents [as well as many websites operated by both ARB and USEPA].

The District is empowered to regulate emission sources and to enforce limitations thereon. In keeping with the necessity to obtain representative samples from regulated sources, aforementioned CARB/EPA methods are applicable.

Particular attention shall be directed to the following features of CARB/EPA methods by testing firms/agencies and owners/operators:

1. Minor changes may not have an adverse effect on the validity of test results. Approval by the District prior to effecting changes shall be obtained. At the test site this may only require noting the change on data sheets. The final report should describe the change and the reasons/causes, which necessitated it.
2. Major changes shall be agreed to prior to the actual field-work in the protocol meeting with the District, affected facility personnel and testing personnel. Should a major change be required subsequent to the start of, or during field-work, the District may exercise the option to invalidate the test/test-run. Then the correct procedures may be followed.

CARB/EPA Method 1 states that one of the two 90° opposed sampling ports (in the same horizontal plane) must lie in the same vertical plane common to the breaching and circular stack which is to be traversed for a particulate sample. This criterion is not applicable to rectangular

stacks/ducts.

Due attention should be directed to the CARB/EPA description of cyclonic/swirling flows and their detection. The District will not accept results of tests as valid wherein these conditions are not measured and documented. Also it is insufficient to expect that because a source has not exhibited cyclonic/swirling flow in the past that the past condition will continue to exist. Historical references are no guarantee as to conditions, which existed during the current tests. Method 2 of CARB/EPA describes mercury columns to ascertain barometric pressures relative to all methods. The District cautions users of these (and aneroid barometers calibrated against them) to document temperature and elevation at the mercury column location and to make the necessary adjustments to the column height for the temperatures and elevation. This should be documented, e.g., a temperature of 70°F requires a subtraction of 0.06 in and a subtraction of 0.10 in @ 70°F is required at 1,000 feet of elevation. For a reading of 26.70 in Hg @ 1,000 ft and 70°F the barometric pressure is therefore 26.54 in Hg.

The District points out that leak checks of the manometer/magnehelic with pitot tube (and ancillary tubing, connectors etc) are mandatory both prior and subsequent to test runs. The District requires that all calibrations mentioned in the methods be strictly adhered to and be fully documented in test reports. Additionally, the test firm shall be prepared to provide photocopies of the calibrations for all critical sampling train components, tare weights of filters to be used and other documentation necessary to the District observer on request. The District may, where practicable, obtain weights of used filters at the affected facility. Method 5 describes in detail, procedures to be followed for obtaining representative particulate matter samples. Specific attention should be directed to the following:

- 1) glass fiber filters are specified. Test reports shall document the manufacturer and salient features of these filters.
- 2) APTD-0581 and APTD-0576 give details of the construction and maintenance of particulate sampling trains.
- 3) last impinger exit temperature.
- 4) when silica gel is used in the last impinger, the District allows weighing the impinger before and after the test run (without removal of the silica gel) to the nearest 1.0 gram. This impinger may be used for the next test run using the final weight of the completed run as the initial weight of the next run.
- 5) Heating of filters in an oven maintained at 105°C for 3 hours (followed by desiccation for 2 hours) and weighed, may be used at the option of the tester both for taring the filter before the test and in the determination of particulate matter after the test. The District may specify other procedures during the protocol meeting.
- 6) Leak checks of the sampling train are required **prior and subsequent** to each test run. Proper documentation of these leak checks on the data sheet is also required.

- 7) During a sampling run the following data recordings are mandatory at each sampling point unless otherwise stipulated in the protocol meeting:
- a) dry gas meter reading NOTE: This reading shall not be on any other line
  - b) pitot reading
  - c) orifice reading
  - d) meter temperature(s)
  - e) last impinger temperature
  - f) stack/duct temperature
- The following parameters should be recorded during the test run: vacuum across the filter, probe heater temperature, filter heater temperature and others which require minimal variations.
- 8) Plus or minus 10% deviations from iso-kinetic sampling rates for the entire run are acceptable. Plus or minus 15% deviations from iso-kinetic sampling rates for a single point are acceptable if the plus or minus 10% criterion is met for the entire run. If either of these criteria are not met, the District may elect to invalidate the run(s) so affected. If one or more of the runs are so invalidated, then the entire test may necessarily be invalidated.
- 9) When the ambient temperature at the site approaches and/or exceeds 100°F, the District may require the addition of salt to the impinger ice bath to ensure the last impinger exit gas remains below 70°F.
- 10) Closures acceptable to the District (for use after sampling) for train components are:
- a) serum caps
  - b) rubber stoppers, except for nozzles when they are used internally
  - c) aluminum foil/ground glass stoppers
  - d) parafilm
  - e) others as accepted in protocol meeting
- 11) The District requires visual inspection of the probe liner subsequent to sample retrieval.
- 12) The District requires that the meter be calibrated within 30 days before and after a test series. Additionally, the meter factors shall agree within 5% considering the before and after test values.
- 13) The District discourages the use of acetone rinses/washes for sample retrieval. Acetone does form inclusion compounds with several inorganic salts and this may bias some results high. Additionally, acetone, being an alpha ketone, may react with SO<sub>2</sub> in aqueous media to form bisulfite addition compounds. Acetone, however, may be used for drying probes, etc.
- 14) The remainder of the non-instrumental methods will be discussed during pre-test meetings.
- 15) If water droplets are present in the gas stream, wet bulb-dry bulb temperatures shall be

determined and moisture concentrations shall be approximated from psychrometric charts or applicable formulae. The lower value of the method 4 (or 5) or psychrometric chart moistures shall be used in volumetric flow rates calculations and dry gas emission rates.

- 16) The District requires that adjustments necessary to the sampling rate from one point in the traverse to the next be effected in less than 30 seconds when the sampling time per point is 3 minutes or more. When the time per point is less than 3 minutes, the elapsed time shall be stipulated in the protocol meeting and formalized in the protocol document submitted to the District.

The above methods and procedures describe the bases upon which the other methods depend except for opacity wherein no samples need be collected.

The District recognizes that instrumental methods are significantly different from the “manual” methods just described. Some obvious differences are as follows:

1. Instrumental readings are “real time”.
2. Manual methods require fixation of gaseous emission samples prior to determination of concentrations.
3. Errors in manual methods at times are not evident until subsequent to final result tabulations.

The District prefers US EPA methods for instrumental determinations when they are required.

The District has determined that the USEPA methods are more rigorous in scope and application than other methods and will adhere to them in principle.

Modifications and deviations from procedures, which are specified by US EPA shall be agreed to by the District, prior to testing, which is the same as with the “manual” methods. This will generally be accomplished in the protocol (or pretest) meeting. These methods are discussed more fully in Appendix C.



## APPENDIX C - COMPLIANCE TESTING METHODS-INSTRUMENTAL

The following methods are to be used to demonstrate compliance when a continuous emission monitor is used to determine a gaseous concentration in a stack/duct effluent. USEPA and/or California EPA (ARB) methods for determining moisture, sampling location, cyclonic flow and others shall be used prior to conducting concentration determinations.

Definitions used are those found in USEPA, specifically 40 CFR, chapter 1, Title 60.

The following sequential steps and acceptable criteria are the District's minimum requirements. Alternate and/or modified methods shall be agreed to during the pre-test meeting and stipulated in the written protocol.

Step	Requirements	Criteria
1. Analyzer Calibration	Operators Discretion	
2. Analyzer calibration error check	Zero Gas Mid-range span 50-60% of the operating range	+ or – 2% of the operating range
Note: The District prefers that a fourth range of 10-30% of the operating range be performed, in addition to those above, but will specify this on a case by case basis.		
3. Sampling system bias	Zero gas; Mid or high range span, whichever is closer to the concentration being determined	+ or –5% of the operating rang from analyzer calibration error check
4. System response time	Time required to make a 95% of an incremental change on the data recorder	
5. Run No. 1	Start time duration	twice the measured response time, one hr
6. Sampling system bias check	Immediately after each run	Same as No. 3
Note: Make no adjustments to the instrument!		
7. Calibration drift check	Zero gas Mid or High range span, whichever is closer to the concentration being measured	+ or – 3% of the operating range

8. Run No. 2                      Same requirements in step 5
9. Sampling system bias check              Same requirements/criteria as step 5

Note: Make no adjustments to the instrument!

10. Calibration drift check              Same requirements/criteria in step 7

Note: Adjustments to the instrument may be made at this time.

11. Run No. 3                      Same requirements/criteria as step 5

12. Same as step 9

13. Same as step 10

14. Reporting                      All test documentation inclusive of strip charts, printouts, calculations etc shall be submitted with the final report

15. The District will determine if any test is acceptable. Failure to comply with any of the above methods will be taken into consideration and the District may invalidate the test in its entirety.

## APPENDIX D - COMPLIANCE TEST METHODS

### Analyses for Particulates

#### Particulates Analyses Policy

The following policy was issued on January 6, 1988 by the Air Pollution Control Officer. This action was taken relative to many questions, which were raised when certain ammonia like additions are made to an effluent stream to reduce oxides of nitrogen (NO<sub>x</sub>) to acceptable levels as required by this District.

**Background:** Several applicants for permits have presented arguments relative to the use of USEPA method 5 and/or 8 and the California EPA (ARB) counterparts and the resulting analyses of the data to determine particulate emissions. Their concerns center on the potential for gaseous chemical compounds present in the exhaust stack/duct gas to form particulate in the sampling train through chemical reaction. The methods, which normally are used have impingers on the so-called “back half” through which the exhaust gas is bubbled. These impingers contain either water or a chemical solution, which provides a medium for reactions, which may lead to the formation of particulate, which was not present, as such, in the process exhaust.

The pertinent rules affected are District rules 404, 405, and 406 for all sources; rules 475, 476 and draft rule 477 for electric power steam/generating equipment; and “Special Permit Conditions” which may further limit the exhaust particulate matter concentration (except for liquid sulfur compounds) based on the process volumetric discharge rate; rule 405 limits the exhaust of solid particulate matter (weight per hour) based on the process discharge by weight; and rule 406 limits the exhaust concentration thereof. Rules 475 and 476 (and future 477) limit the combustion contaminants in excess of both 11 lb/h and 0.01 gr/SCF @ 3% O<sub>2</sub>, dry gas, averaged over 15 consecutive minutes.

Rule 102 (Definitions of terms) defines the following:

1. Particulate Matter as “any material, except un-combined water, which exists in a finely divided form as a liquid or a solid at standard conditions”
2. Solid Particulate Matter as “particulate matter which exists as a solid at standard conditions”
3. Combustion Contaminants as “particulate matter discharged into the atmosphere from the burning of any kind of material containing carbon in a free or combined state”
4. Standard Conditions as “a gas temperature of 60°F and pressure of or 29.92 in mercury column, absolute.” It should be noted that solid, liquid and gas have their ordinary meanings as defined in any standard chemistry text.

As can be seen from the definitions, the state of the emissions at standard conditions is determinant, although very few sources emit contaminants (pollutants) at standard conditions. It follows, therefore, that methods must be employed which can sample the source of emissions at other than standard conditions and extrapolate the results. Almost every sampling method used

for determining particulate matter employs drawing the source gas through a filter medium, then through ice-chilled water impingers, and then measuring the resultant dry, cooled gas with a calibrated meter. The filter catch and the wash of the probe preceding the filter represent the weighable fraction of the particulate matter present at an elevated temperature (nominally 248°F  $\pm$  20°F). However, should the source particulate matter be of sufficiently small particle size to escape capture by the filter medium or condense to form particulate on cooling to standard conditions, the impingers (back half of sampling train) then collect all but those particles whose physical and chemical properties preclude their capture.

It is also highly probable that some gases react in the impinger water and/or solution to form compounds not originally present in the source gas stream. It is also highly probable that these gases (or gases emitted by another source) will react to form secondary particulate matter in the atmosphere. However, these secondary particulates are not regulated under the rules cited above, only those present in the exhaust stack/duct flow.

Some flue gas control devices/methods involve the addition of a chemical specie such as ammonia to reduce the emissions of a regulated gaseous component, such as NO<sub>x</sub>. This additive may not react appreciably to form particulate matter in the source gas stream but **DOES** so substantially in the aqueous portion of the sampling train, i.e., the impingers. When the impinger collection is subsequently analyzed for particulates, these reaction products are included as emitted particulate matter. The USEPA method 5 only requires measurement of the filter catch and the washes of the sampling train internal surfaces upstream of the filter. Thus, consideration of the particulate of the back half of the sampling train is at the discretion of the District. California EPA (ARB) and other agencies with whom, the District has consulted, have offered no consistent interpretation.

**THEREFORE:** the policy of this District, based on definitions in rule 102, shall include for the purpose of determining compliance, the following particulate catches from a sampling train:

1. For rule 404 and that portion of particulate matter referenced in rules 475, 476 and proposed rule 477, both the front half catch (particulate caught on the filter and the washes of the internal surfaces of the probe liner, nozzle, connectors, and the filter holder upstream of the filter) and the back half catch (which includes washes of the internal surfaces of the filter holder downstream from the filter, connectors and impingers plus the impinger fluids) less any material that can reasonably be assumed to be formed by reactions in the impingers based on information supplied by the facility o/o.
2. For rule 405, only the front half catch (same as above).
3. For rule 406, since this rule applies to specific contaminants in any chemical form, no action relative to this rule is proposed.

The o/o shall submit an appropriate written test protocol, presenting arguments for a proposed exclusion/exception under this policy and receive approval of the protocol by the District. This protocol will generally follow a pre-test meeting during which the methods to be employed were described to the District.

The test protocol shall, include but not be limited, to the following:

1. Those minima requirements described in the earlier part of this Manual.

2. Proposal for correction to the back half catch for determining compliance with each and every applicable rule as mentioned above. Specific to this proposal shall be at least the gas composition, probable mechanisms for particulate formation in the impingers (with rationale for predicting these formations), chemical analyses to be used for the identification and quantifying of particulate in the impingers and a proposed method of correction.

The District will review the compliance methods on a case by case basis. Emphasis will be placed on the analysis of impinger collection, filter and probe temperatures maintenance during sampling, gaseous analysis concurrent with particulate matter collection, mass balances, documented filter characteristics and other parameters which shall be submitted to the District in order to assist in the evaluation of compliance. The District would be remiss if we did not state the following: These exclusions and/or exemptions are NOT automatic. If, they are not approved beforehand by the District, no consideration will be given to them.